EVN Performance and Reliability

Benito Marcote

(on behalf of EVN Support Scientists)

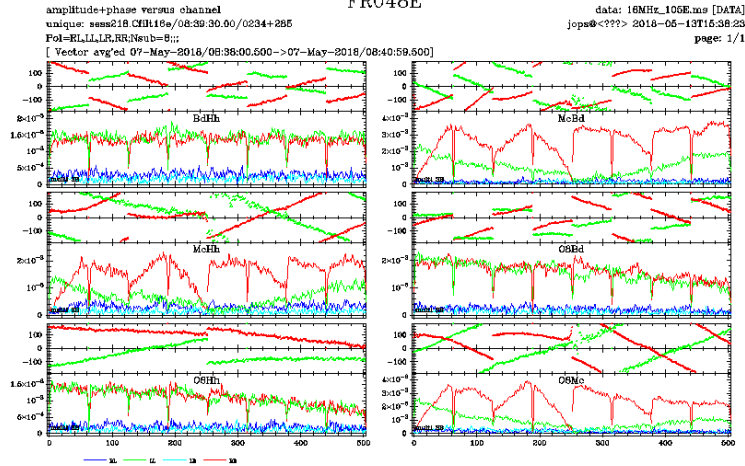
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EVN TOG Meeting, Manchester 2019

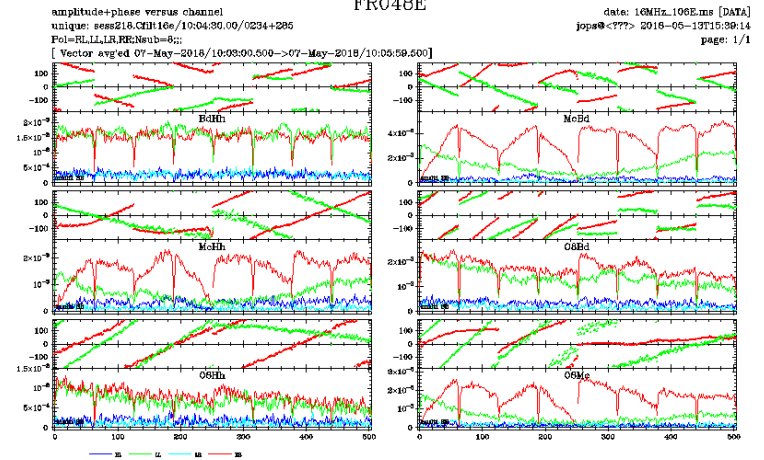# DBBC Issues

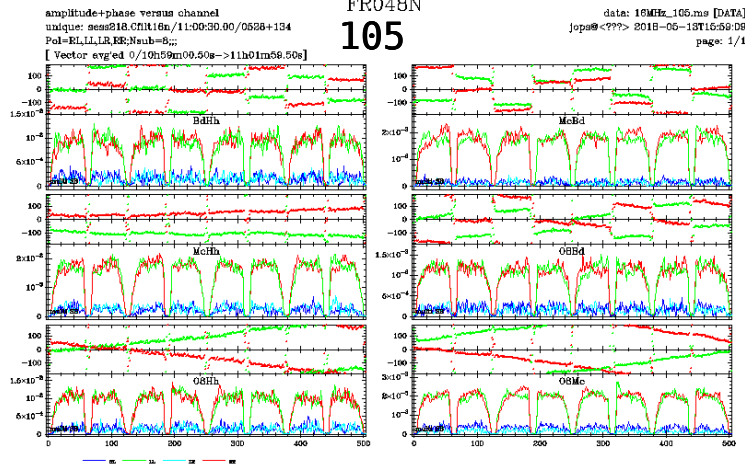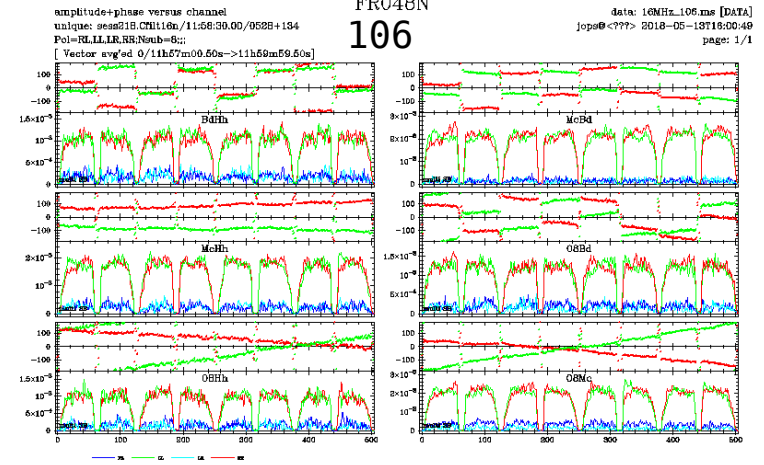105E

106E

105

106

DBBC Issues - v107

amplitude versus channel
unique: 13:13:30.00/sess119.M128/3C84
Pol=LL,RR;Nsub=8;;;
[Scalar avg'ed 0/13h13m00.00s−>13h14m00.00s]

N19M1

data: n19m1.ms [DATA]
jops@<???> 2019−05−22T15:13:33
page: 2/2
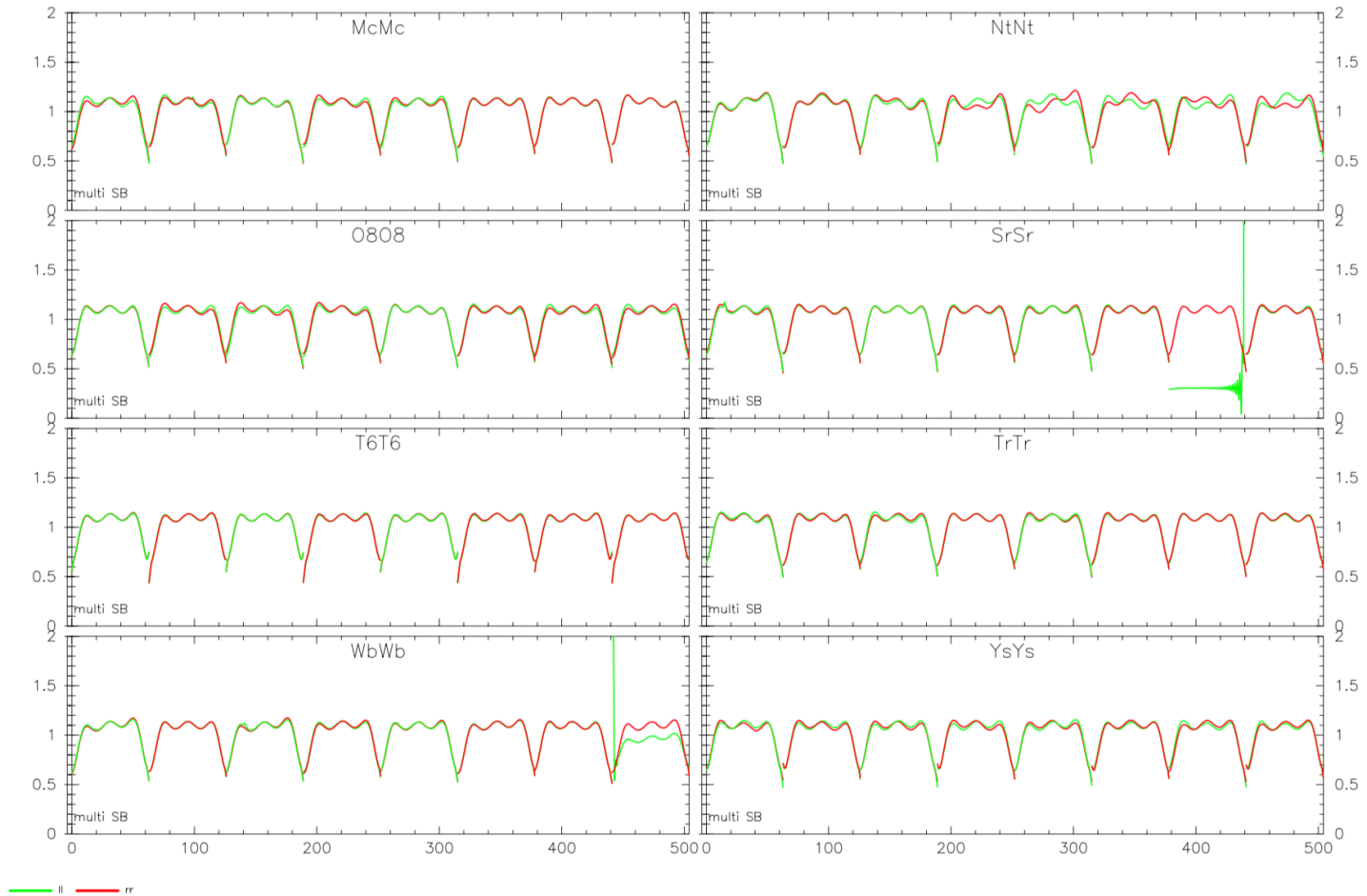
DBBC Issues - v107

- Issues from the stations? Loading times?

- Big remaining issue: negative Tsys TPI values in log files!

- Useful data from Session 1 and 2?

- Uwe script to fix the negative values and create ANTAB...

  Does it take into account -2.0 values?

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NME Results & Feedback

2018 Session 3 – NME Results

- **L band**
  - Tianma: high leakage in cross pols. Already reported in the past.
  - Urumqi: Linear polarizations.
  - Jodrell Bank: Using Rubidium maser. LO tuning improved.
- **S/X band**
  - Westerbork, Effelsberg: recording issues. Unclear reasons (fila10G?). Fixed after NME.
  - Noto: no fringes at X band.
  - Tianma: only fringes in S/X.
- **C band**
  - Noto: broken C-band receiver.
  - Tianma: broken drive system.
- **K band**
  - Noto: No feedback provided on www.

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2018 Session 3 – Feedback

- **Tianma**: ~50% polarization leakage (old problem).

  Disk packs overwritten due to the use of old version.

  Antenna elevation drive failure on 17 Oct 2018.

- **e-MERLIN:** fringes! But recording issues.

- **Urumqi:** linear polarizations.

- **Westerbork:** high leakage between polarizations.

- **Noto:** mostly out due to broken C-band receiver.

- **Kunming:** unstable fringes (only in part of observations). Reasons?

- **Westerbork:** maser out of lock. No fringes.

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2019 Session 1 – NME Results

- **L band**
  - Jodrell Bank (Lovell): Warm receiver.
  - Onsala: stopped due to strong winds.
  - Tianma: linear polarization.
  - Urumqi: linear polarization. Invalid TPI recording.
  - Svetloe: broken LCP.
  - Arecibo: did not participate. No feedback.
- **C/M band**
  - Tianma: High leakage between pols. fixed!
    Vdif data in parallel: weaker fringes.
  - Urumqi: swapped polarizations. Invalid TPI recording.
  - Svetloe: broken LCP.
- **K band**
  - Effelsberg: out due to strong wind.
  - KVN: 7% invalid data.
  - Noto: no fringes detected. No feedback in www. Unclear problems.

2019 Session 1 – Feedback

- **Tianma**: Fixed the polarization leakage.

- **Urumqi:** No ANTAB files produced (invalid TPI recording).

- **Svetloe:** Broken L-band LCP.

- **Jodrell Bank:** Wiggles in LCP discovered! (since 2017/2). Only visible with high frequency resolution. Problematic receiver board in one optical-to-RF converter (*solved for 2019/2*).

- Medicina: Drive control broke during e-EVN (22 Jan 2019).

2019 Session 2 – NME Results

- **L band**
  - Tianma: vdif data in parallel. Similar signal.
  - Arecibo: problems extracting the data. Solved after NME.
- **C band**
  - Tianma: high percentage of invalid data in some scans.
  - Kunming: fringes only in RCP (after changing from CDAS to DDBC2).
- **M band**
  - Effelsberg: linear pols.
  - Sardinia: antenna control problems.

  Tr: vdif data

- **X band**
  - Urumqi: swapped pols. Fixed during NME.
- **K band**
  - Tianma: broken hard drive fixed afterwards.
  - KVN: ~25% of invalid data due to time offset (1s OFF).

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Summary from October–June

- **KVN:** joined Mattermost last months.

- **Urumqi:** Where are you during NMEs?

- **Noto:** Where is Noto recently? (no feedback, log, ANTAB files).

- **Sardinia:** Low amplitude in channel 7 (of 8) LCP.

- **Kunming:** signal dropped with no apparent reason.

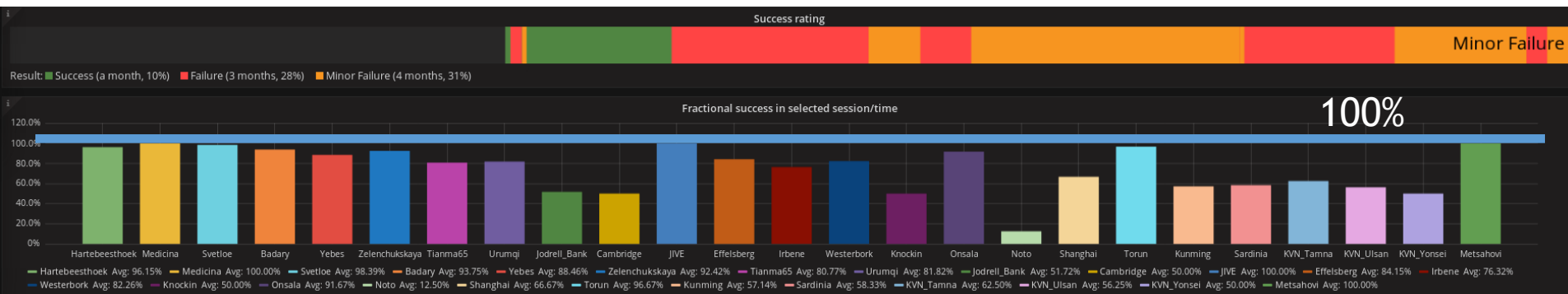- **Tianma:** Do you still need to send vdif and mark5b data?

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Summary from October-June

Green: success (10%).
Orange: minor failures (46%).
Red: failures during observations (29%).

Amplitude calibration

Submission of ANTAB files

• LOG files missing (*no flagging possible!*).

• Lack of ANTAB files:

  • Many stations do not upload ANTAB files after experiments.

  • Critical in e-EVN.   >4 months in regular EVN…

  • Notify us when uploaded!

• Last e-EVN (18 June 2019):

   LOG files (Bd, Zc, Ir, T6).

   ANTAB files (Bd, Zc, Ir, Mc, T6, Tr, Jb).

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Submission of ANTAB files

- In almost all experiments there are missing ANTABs.

- Nt, T6, Tr,...

- KVAZARs:

  ‣ 0.0/999s fixed.

  ‣ Long intervals between values (only TPIcal).
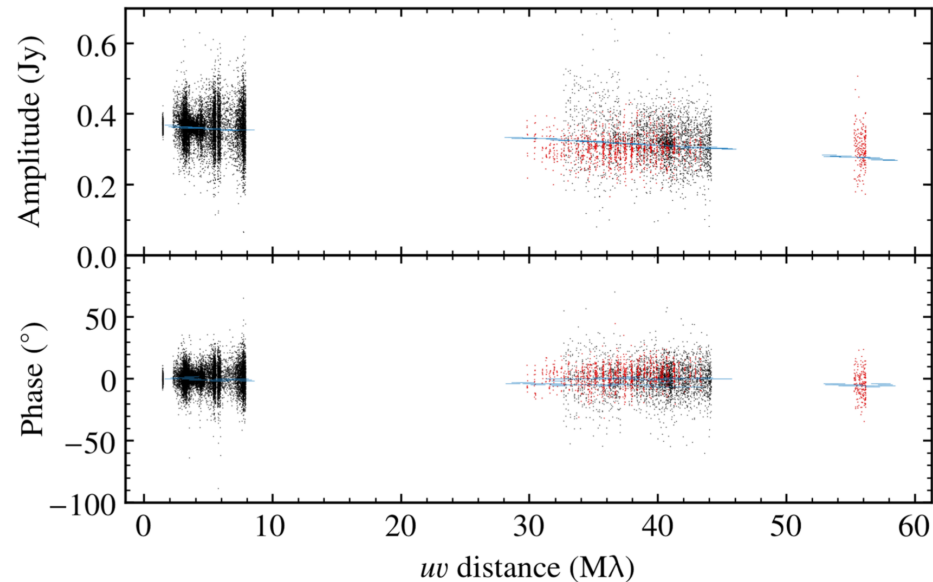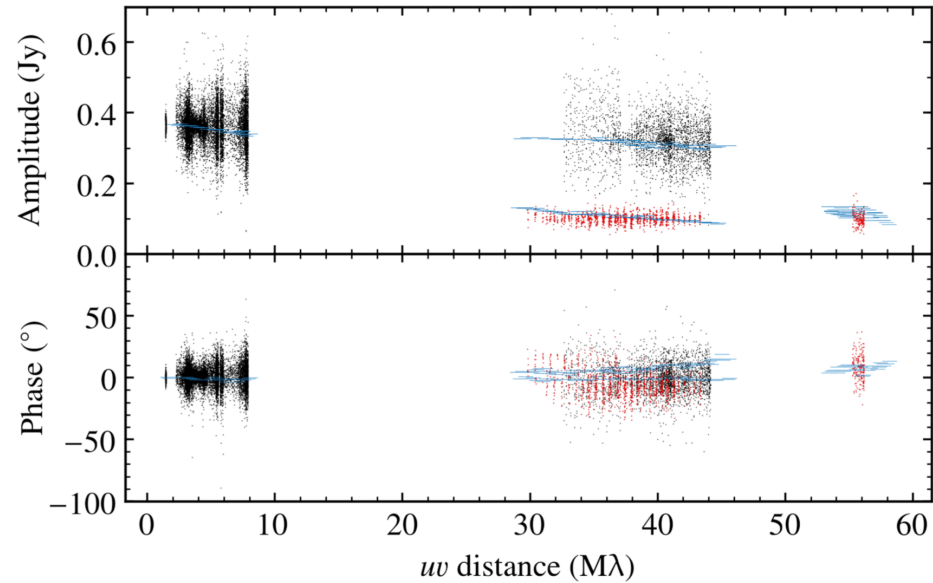
Submission of ANTAB files

	3/18	1/19	e-EVN	...	
Ef			0		
Wb			0	-	
Ys	3		0		
On			0		
Ir			0		
Nt	10	40	3	-	
Mc	0		3		
Hh			0		
Ur	0	0			
T6	-		5	0	
Tr		5	11	0	-
KVAZAR	18	6			

Delays in days since ANTAB files were requested since 2018 Session 3.
Multiple experiments from the same session are clustered in one value.

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Median absolute error in gain calibration

L band

Wb	Bd	Ef	Hh	Ib
0.18	0.11	0.05	0.07	N/A
J1	J2	Mc	O8	Sr
0.14	0.09	0.13	0.06	0.3
Sv	T6	Tr	Ur	Zc
0.3	0.2	0.09	0.3	0.19

C/M band

Wb	Bd	Ef	Hh	Ib	Ar
0.2	0.10	0.05	0.06	0.15	0.07
Ys	J2	Mc	O8	Sr	Km
0.15	0.12	0.06	0.07	0.3	0.7
Sv	T6	Tr	Ur	Zc	Nt
0.07	0.04	0.15	0.12	0.15	0.11

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Median absolute error in gain calibration

X band

Wb	Bd	Ef	Nt	Sv
0.4	0.2	0.04	0.7	0.11
T6	Ur	Ys	Zc	O6
0.14	0.2	0.14	0.2	0.08

K band

Mh	Bd	Ef	Hh	Kt	Ku
0.2	0.3	0.17	0.19	0.15	0.4
Ys	J2	Mc	O6	Sr	Ky
0.17	0.3	0.14	0.3	0.13	0.17
Sv	T6	Tr	Ur	Zc	Nt
0.3	0.3	0.17	0.4	0.17	0.2

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Improvements achieved!

- **Jodrell Bank**: continuous Tsys. ANTABs. Fixes, fixes, and fixes…

- **eMERLIN out-stations**: fringes and reliable data.

  Improving one problem at the time.

- **Tianma**: high pol. leakage fixed.

Need to Improve

- **Noto**: unresponsive?   Log and ANTAB files?

- **Urumqi**: Participation in Mattermost?

- **Tianma**: Bad gain calibration (ANTAB info).

- **KVAZAR (+Ur)**: ANTAB file with good time sampling.

Questions raised from Support Scientists

- Join chat during NMEs and e-EVN runs

- Station feedback (and detailed)!

- Upload log files to vlbeer (every time less files...)

- Upload ANTAB files to vlbeer after the observations

  (and check them beforehand, inform us about issues)

- Update your local scripts (e.g. antabfs.py)

- *Be responsive to emails and provide feedback!*

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